DATAWIN
Data Capturing Solutions

OMR 300S

Optical Mark Reader
with Stack Feed and Sorting Stacker

User Manual

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1 Introduction

1.1 About this manual

This manual is intended for users who are entrusted with the setting up, installation and operation of the OMR 300S optical mark reader (OMR = Optical Mark Recognition).

- **Part 1** provides information about
  - unpacking and storing the device and device related safety information
  - connection to the mains source and authorization as well as
  - the requirements on the operating environment.
- **Part 2** informs you about
  - the most important functional components, their designations and arrangement as well as
  - the main mode of operation.
- **Part 3** describes
  - the assembly of the adjustable feet and the document output trays and also
  - the installation of the OMR 300S - from connection to the PC up to conducting a test run.
- **Part 4** provides tips and information to facilitate faultless operation of the OMR 300S.
- **Part 5** shows how you can increase the reading reliability:
  - by mechanical adjustments in the reader and
  - by a simple cleaning procedure of the OMR 300S.
- **Part 6** contains the DATAWIN OMR document specifications.

1.1.1 Typographical notes

! This symbol calls your attention to particular items that absolutely must be observed.

♦ This symbol always appears before process sequences and it simultaneously indicates the chronological sequence.

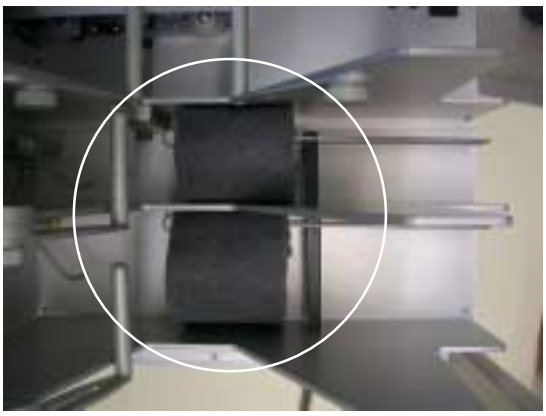
1.2 Information about unpacking the mark reader

The reader lies with its rear side towards the bottom inside the packaging. The accessories are contained in a separate box.

- Lift the cover along with the attached filling materials vertically out of the packaging.
- Carefully tip the box to the side so that the reader stands on its adjustable feet. Then grasp the reader by the two adjustable feet and pull it out of the box.

! When carrying the reader as well, it is best to grasp it only by the adjustable feet.
The device weighs about 20 kg.

- Remove the two pieces of foamed material in the output trays of the reader.



! Save the entire original packing for later transportation and shipping of the mark reader and the sorting stacker.
Devices that are sent back to suppliers for maintenance or repair work are always returned in their original boxes (possibly at cost of the sender).

1.2.1 Scope of the delivery

Check to make sure that the delivery is complete. All accessories required for the connection and operation of the OMR 300S are included in the delivery:

- mains cable
- data cable
- tools
- CD ROM with installation software and manual

If something is missing or if damages occurred during transportation, please contact your supplier.

1.3 Device related safety information

1.3.1 Conformity

The OMR 300S reader conforms to the CE standards and guidelines for data processing devices (design according to VDE 0805/5.90, interference suppression according to VDE 0871-B). It can be operated continuously under normal room conditions.

1.3.2 Precautionary measures for transportation, storage and installation

Please observe the following points regarding the transportation and installation of the reader:

Transportation and storage

- Transportation of the reader should only be effected in the original packing. It protects against shocks and inadmissible strains on the mechanical parts.
- Please take the ambient conditions into consideration when transporting or storing the reader.

Mains connection and authorization

- The reader may only be operated when connected to a grounded shockproof outlet. Industrially operated mains networks often exhibit substantial, load-dependent interference peaks (powerful motors, electrical welding plants, etc.). The OMR 300S reader is protected against such interference to a great extent, but if interference is present, try to use a network used for EDP or select a mains supply that is free of interference.
- Make sure that the mains voltage that is present corresponds to the required values stated on the type plate.
- Never open the housing of the reader and never remove any housing parts.
- Always turn the reader off via the mains switch before carrying out any adjustments or cleaning operations.
- It is forbidden to effect changes or modifications to the reader that are not stated in this manual. The manufacturer of the device will decline any form of guarantee demand and will not accept any service clauses if it can be demonstrated that the reader was manipulated or damaged by unauthorized persons.

1.3.3 Selection of the work site

Take care to assure that the OMR 300S is exposed to appropriate operating conditions. This is important in assuring faultless functioning of the reader:

- The reader must stand on a stable, horizontal and level surface. Its dimensions are 630 x 340 x 300 (L x W x H in mm); the reader weighs 20 kg. Vibrations at the work site should be avoided.
- The permissible ambient temperature for operation of the reader is +10° C to +40° C (50° F to 104° F). Therefore, check to assure that the device is shielded against sources of heat such as direct sunlight, radiators, spotlights or other sources of light that produce heat.
  Sunlight or foreign sources of light applied to the scanning unit under unfavorable circumstances may also have an influence on the read sensitivity.
- The permissible relative humidity amounts to 40 - 60%, condensation-free.
- It must be possible to lay all cables (mains cable and data cable) without buckling and without tensile stress. Take care to identify stumbling pitfalls.
- The OMR 300S corresponds to the requirements regarding interference emission and resistance to jamming (ESD) as specified by the CE guidelines. In order to assure complete interference immunity, shielded data cables with connector casings of metal or with metallic connector casings must be used.
- Take care that the device is not operated in surroundings that are contaminated by dust or oil. Air currents caused e. g. by windows that are continually left open, by passageways or ventilators, may lead to the increased production of dust and this in turn may necessitate shorter maintenance and cleaning intervals.
- The work site must afford sufficient space for the handling of the documents.

2 The OMR 300S optical mark reader

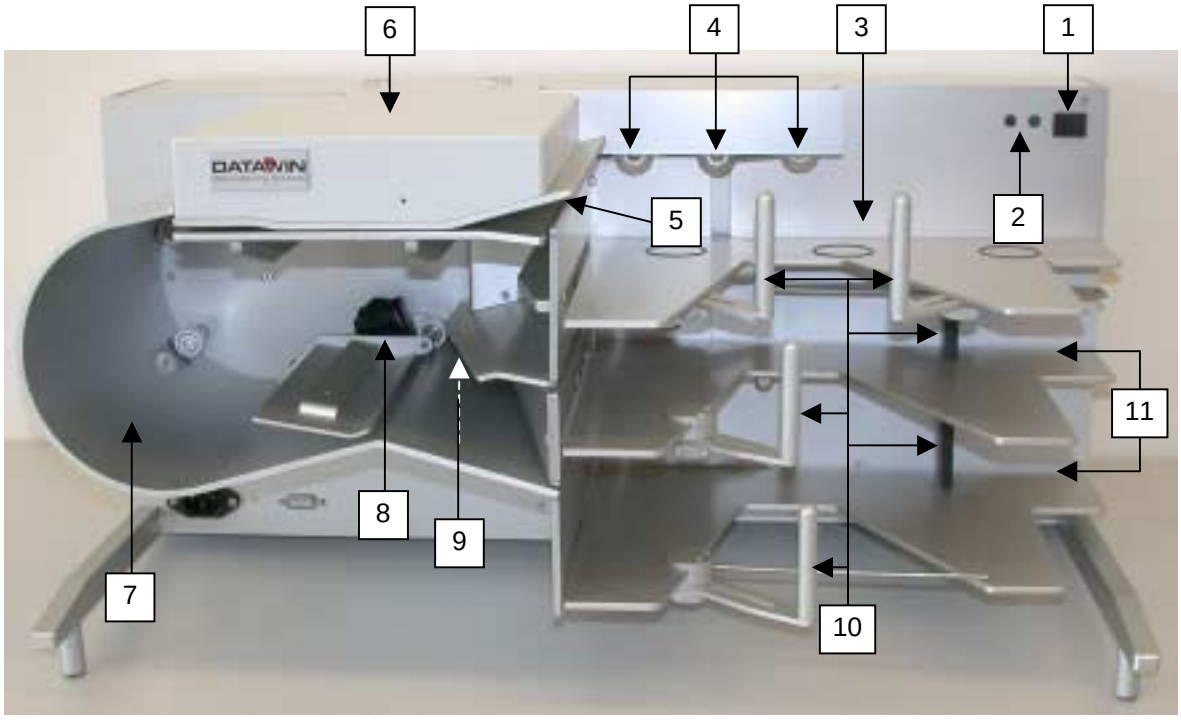
This chapter provides information about the most important system components, their designations and arrangement and describes the basic mode of operation. The uniform designation employed here in the description of the individual components of the reader will simplify understanding of the reading process, of the operation of the device and of the maintenance work.

2.1 Functional components

The OMR 300S is an optical mark document reader with stack feed and two sorting stacker trays. It was designed as a high-capacity desk reader with the greatest possible operating ease for efficient data input. As options, the device can be equipped with

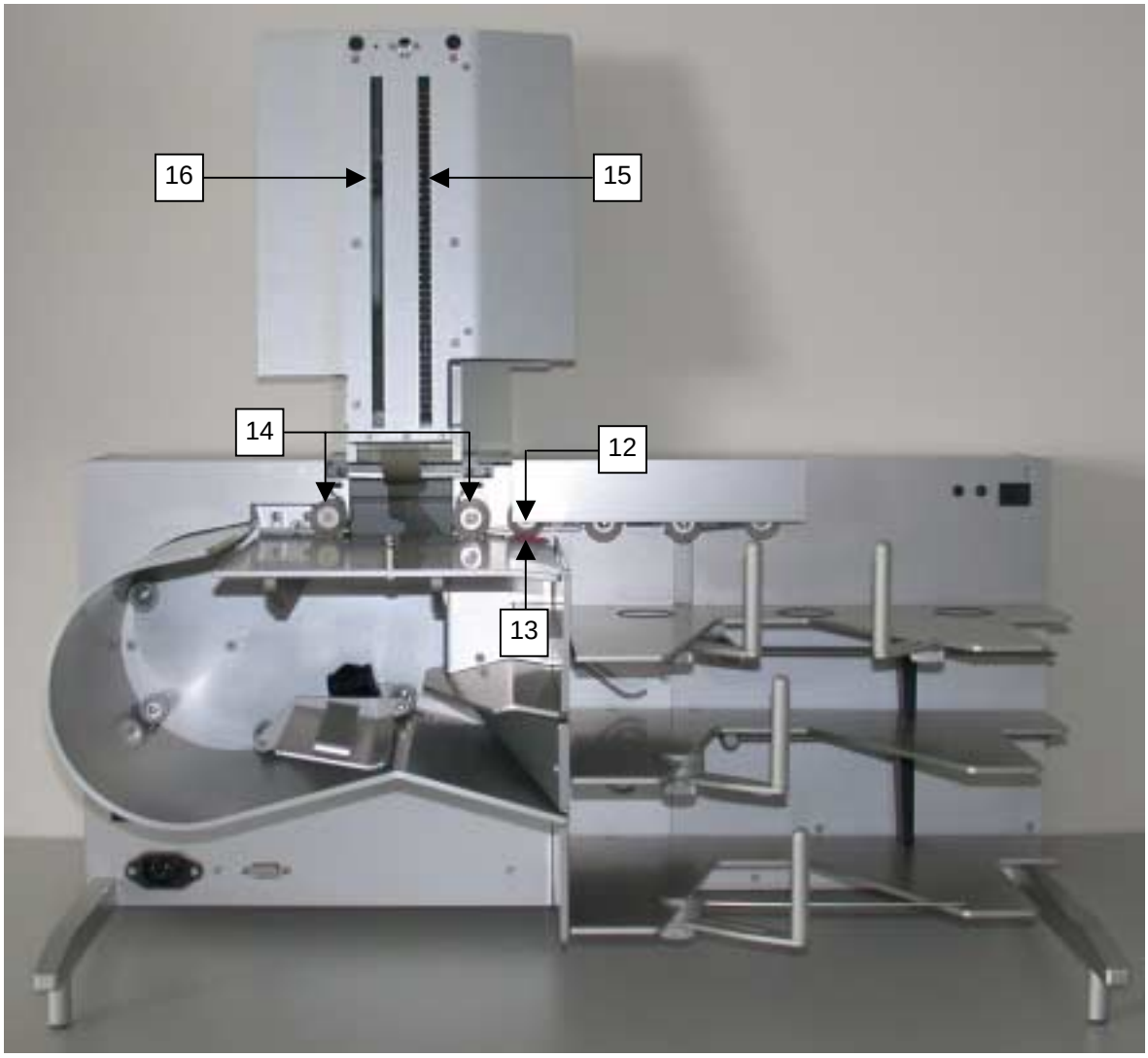
- a second OMR read head for the simultaneous reading of the front and back sides of a document,
- a two-line bar code read head adjustable across the entire width of the document,
- an ink jet printer (HP ink jet printer),
- a multiple line display for user guidance.

The reader operates with a CPU of the latest generation that guarantees high reliability and speed for the data input directly from the document into the computer. The two following figures show the components of the reader that are most important for operation.



1 Button for the document intake tray
2 Display of the operating status
3 Document intake tray
4 Feed rollers
5 Automatic document intake
6 Hinged upper scanner cover
7 Curved baffle plate
8 Optional printer
9 Sorting deflector
10 Adjustable document stoppers
11 Document output trays
12 Intake roller
13 Separating belt
14 Transport rollers
15 OMR read window
16 Bar code read window

This figure shows the OMR 300S reader with opened scanner cover:



2.2 Document processing - from intake to output

2.2.1 Automatic document intake

The documents are automatically taken from a stack on the document intake tray. The topmost sheet is thereby "pulled off". A special intake system consisting of three feed rollers, one intake roller and a reverse belt, the so-called separating belt, assures the safe "isolation" of the documents. The feed rollers and the intake roller are fitted with special silicone rings.

The three feed rollers are positioned at a slight slant to the feed direction and they thus bring the top document into a position pressing against the back stopper. You can set the interval between the separating belt and the intake roller according to the thickness of the documents in use.

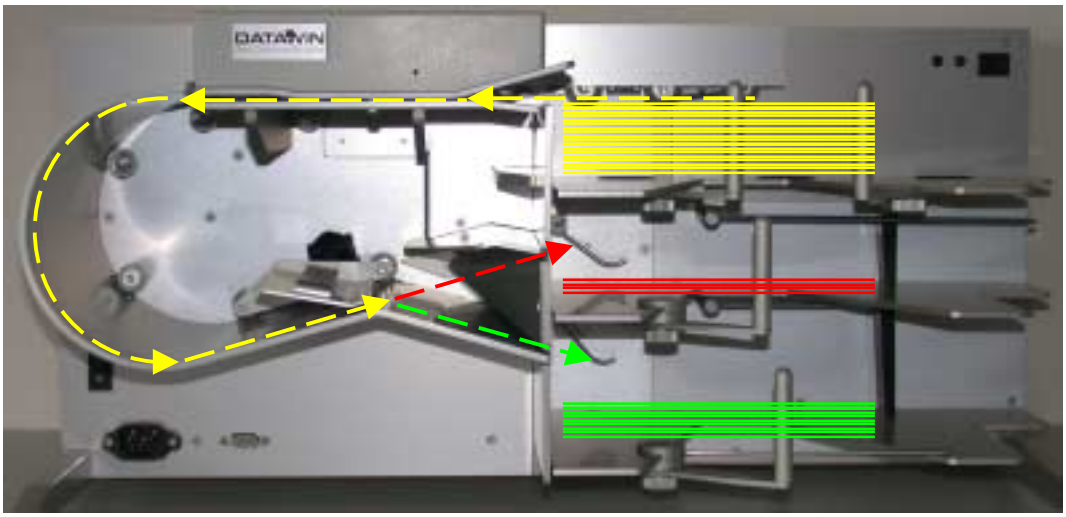
The presence of documents in the intake tray is monitored by a light barrier. When the reader starts operation the intake tray moves upwards and the light barrier is queried. Only if at least one document is present in the intake tray is the document transport started. (If the intake tray is empty, it moves down to the bottom again.) A second light barrier is responsible for double document

detection. After the last document has been processed, the read process is stopped and the intake tray moves down to the bottom again.

2.2.2 Document transport path

The documents that are drawn in individually are moved across a number of transport rollers whereby they successively pass the read stations. The transport speed amounts to up to 1.2 m/s, the read rate lies at a max. of 6,000 DIN A4 documents/hr.

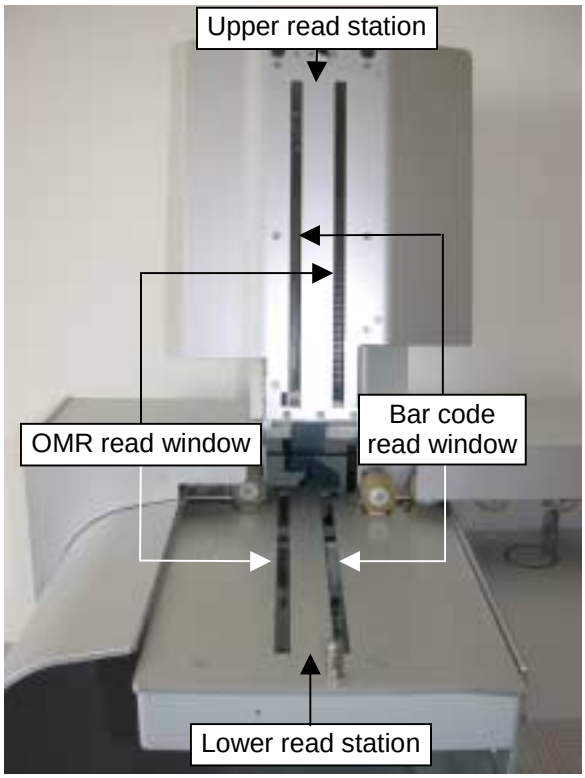
In order to monitor the positions of the individual documents, the entire transport path is equipped with light barriers. The figure below shows the transport path of the documents in the OMR 300S.



2.2.3 Read stations

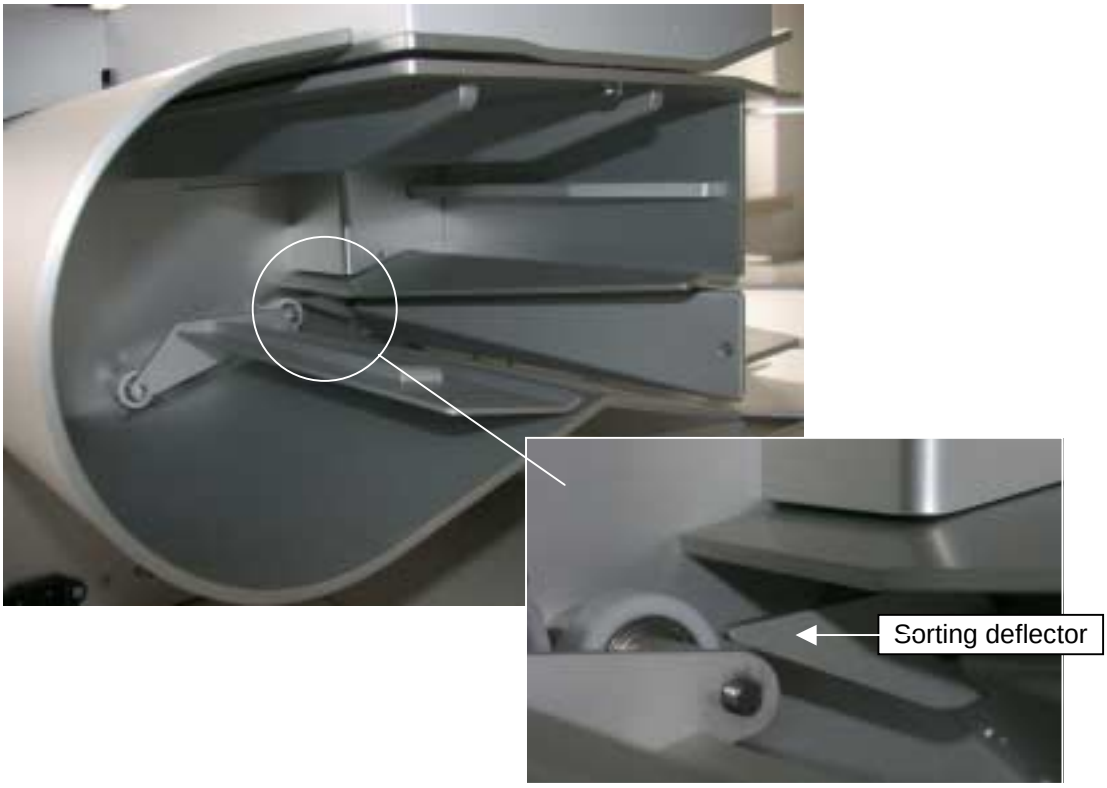
Depending upon the requirements of the application, the OMR 300S can be equipped with up to two optical mark and bar code read heads for the front and back sides of the document. To protect against dirt, the read stations are covered by protective glass.

The optical mark read heads, depending upon the requirements for usage, can be designed with infrared or with red light. The readers achieve a mark density of 40 tracks (1/5" interval) or 48 tracks (1/6" interval).

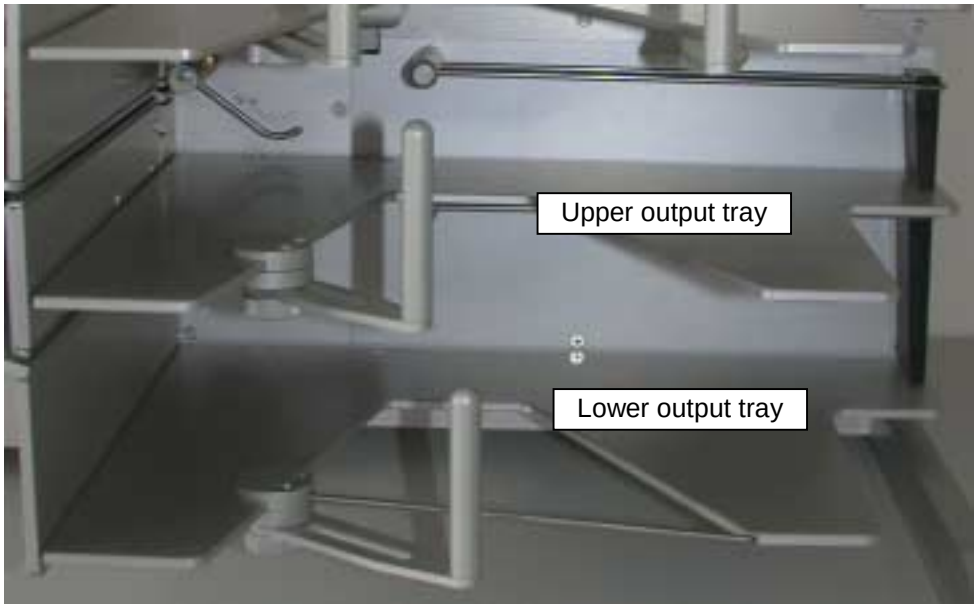


2.2.4 Sorting deflector and document output

After the documents have passed the read stations and the curved baffle plate they are deposited - controlled by the sorting deflector - in one of the output trays.



The criteria for this are laid down in the application program, e. g. if the read result is evaluated as poor, the faulty document is deposited in the upper output tray (the "bad" tray).



2.2.5 LED display and tray button

Two control lamps show the operating status of the reader (see section 4.3.1). The button enables manual control of the document intake tray.

2.2.6 Optional printer

As an option it is possible to integrate an ink jet printer in the reader. The type used is an HP ink jet printer. The installation position is located in the lower transport path next to the curved baffle plate.

The printer is designed for alphanumeric character output with a density of up to 8 characters/25.4 mm and up to 50 characters per document. The printout is produced on the rear side of the document. The information to be printed, e. g. a document number or the designation of the processing procedure, is parameterized in the application program. Further information on the application program is to be found in the corresponding manual.

Information on how to exchange ink cartridges is contained in section 5.4.

3 Preparing and installing the reader

This chapter describes how to attach various accessories to the reader and how to proceed with the installation – from connection to a host (PC) up to conducting a test run.

3.1 Attaching the inclined adjustable feet

You can improve document guidance in the OMR 300S reader if you set it up so that it is not completely level on the work surface, but rather slightly inclined toward the back. For this purpose two spacers are included in the delivery that you can insert into the corresponding bore holes at the front bottom side of the two adjustable feet.

- Lift the reader slightly at the front by the adjustable feet, “feel” for the bore hole and insert a spacer into the bore hole of each foot until it doesn’t fall out again.

- Then set the reader down again on the adjustable feet and press uniformly on both feet until the spacers are inserted up to the limiting position in the bore holes.

3.2 Adjusting the document stoppers

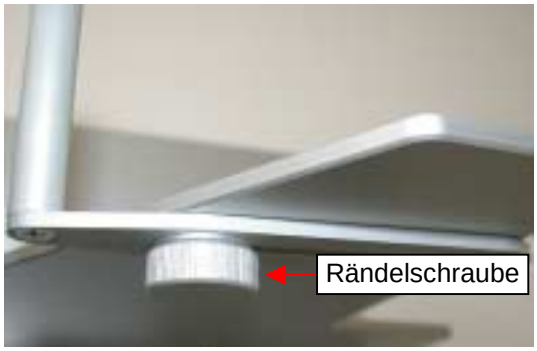
To assure safe feeding in and depositing of the documents, you must set the document stoppers to correspond correctly to the size of the documents to be used, before you start operation of the reader.

! It is absolutely necessary that you observe the following adjustment criteria.

3.2.1 Intake tray

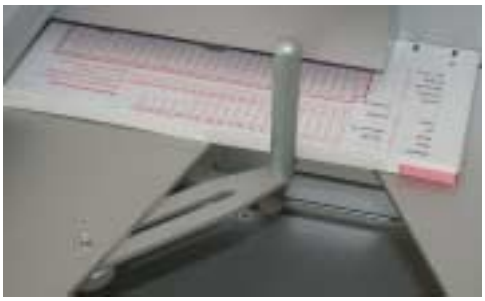
! The two stoppers in the intake tray must lie flush against the stack of documents, but they may not impede the document intake.

♦ Place a stack of documents into the intake tray and loosen the two stoppers by means of the knurled screws; adjust the stoppers to accommodate the size of the documents to be processed and then tighten them again:



e. g. for large documents ...

... or for smaller ones:



3.2.2 Output trays

! In the output trays the stoppers should be at an interval of about 1 to 2 cm from the documents. The documents ejected must be able to fall “freely” onto the stack of documents.

♦ Place a stack of documents into each of the output trays and set the respective document stopper accordingly.

♦ In order to limit the extent of the ejection of the documents in the output trays, push the respective black stoppers in the two output trays accordingly and set them so that here as well the documents only have a maximum play of 1 to 2 cm.

Tip: These stoppers can only be pushed easily against frictional resistance if you grasp them as far as possible near the top.

3.3 Inserting ink cartridges in the (optional) printer

If your OMR 300S is equipped as an option with a printer, you must insert an ink cartridge before initial operation. Use ink cartridges from HP (HP51604A) or other cartridges compatible to these.

You can read about how to insert or exchange the cartridges in section 5.4.

3.4 Mains connection data

The power supply of the OMR 300S is designed for the following voltage and frequency ranges:

- Power supply: 230 V, 50 Hz (0,6 A)
  115 V, 60 Hz (1,2 A)
- Current consumption: max. 100 W
  (with all options)

Normally no special provisions or settings of the voltage supply are required for the operation of the OMR 300S. However, check whether the existing mains voltage actually corresponds to the values on the type plate of the reader.

3.5 Data interface

The serial interface of the reader is executed as a 9-pin socket terminal strip. The simplest connection is a "three-wire" connection without hardware handshake. Bridges on the side of the reader are not necessary. The basic parameterization of the reader supports this operating mode.

	Pin assignments	
Pin	**"three-wire" assignment**	**complete assignment**
Pin 2	TxD	TxD
Pin 3	RxD	RxD
Pin 5	SGND	GND
Pin 6		DTR (+12 V are present after "power on")
Pin 7		CTS
Pin 8		RTS (+12 V are present after INIT)

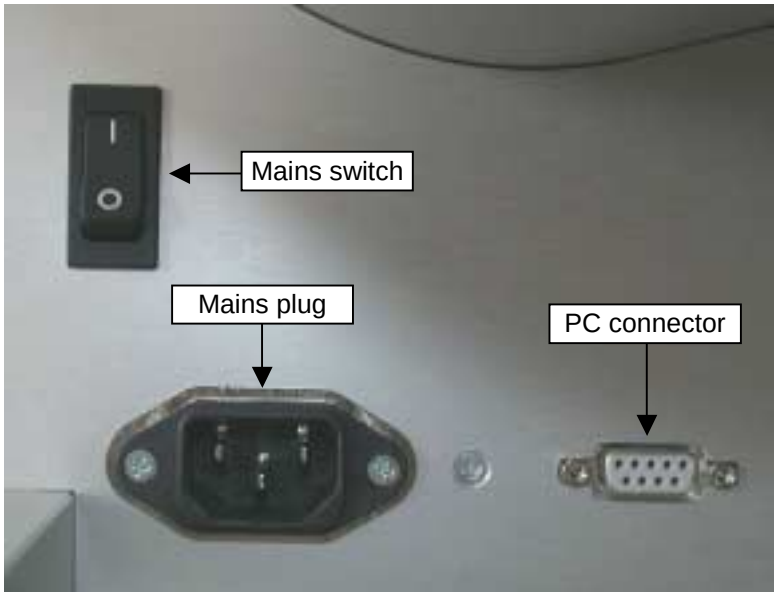
3.6 PC connection

3.6.1 Minimum requirements on the PC

The minimum requirements on the PC can nowadays be fulfilled by every commercially available system. If the test program "OMR-Test" (see the "OMR 300S Technical Operating and Service Manual") is to be installed, a CD drive must be connected.

3.6.2 Connecting the reader and the PC

- Run down the operating system of the PC and turn the PC off.
- Insert the mains plug into the connector of the reader and then the mains cable plug into a mains socket.



- Connect the interface cable to an unoccupied RS232 connector of the PC and tighten the data plug with the respective screws.
- Connect the data cable to the connecting socket of the reader and tighten the plug here as well.
- Turn on the reader by means of the mains switch.
- Turn on the PC and run up the operating system.

3.7 Software

The control of the reader is effected by means of device-specific interface firmware and – via the connected PC – by means of read software designed according to the user application.

3.7.1 Interface firmware

The communication between the OMR 300S and the PC is controlled via the interface firmware, consisting of

- the standard interface and
- the interpreter interface.

How to read out and set the interface parameters is described in separate manuals.

3.7.2 Read software

The read program itself defines the processing of the marks and bar codes that are read out on the PC. This program is always adapted specifically to the respective application of the OMR 300S. How to install this software on your PC and how to work with it is described in a separate manual.

3.8 Testing the read functions

Upon completion of the installation steps the reader is ready for operation and you can test the reading of the marked documents (see section 4). Check thereby if the reader operates faultlessly and if all the functions are executed in accordance with the intended practical usage. Conduct the test only with documents that you will actually use in practical operation. In this regard, also note the document specifications contained in chapter 6.

The special test program "OMR-Test" is also at your disposal for certain tests and functional settings of the reader. The method of operation of this test program is described in the "OMR 300S Technical Operating and Service Manual".

3.9 De-installing the reader

- ♦ De-install the read software on the PC if it is present.
- ♦ Run down the operating system of the PC and turn the PC off.
- ♦ Turn off the reader.
- ♦ Loosen and unplug the connectors of the data cable at the PC and at the reader.
- ♦ Unplug the connectors of the reader mains supply cable.

4 Operation of the reader

This chapter provides you with tips and information to assure faultless operation of the OMR 300S.

4.1 Requirements placed on the documents to be scanned

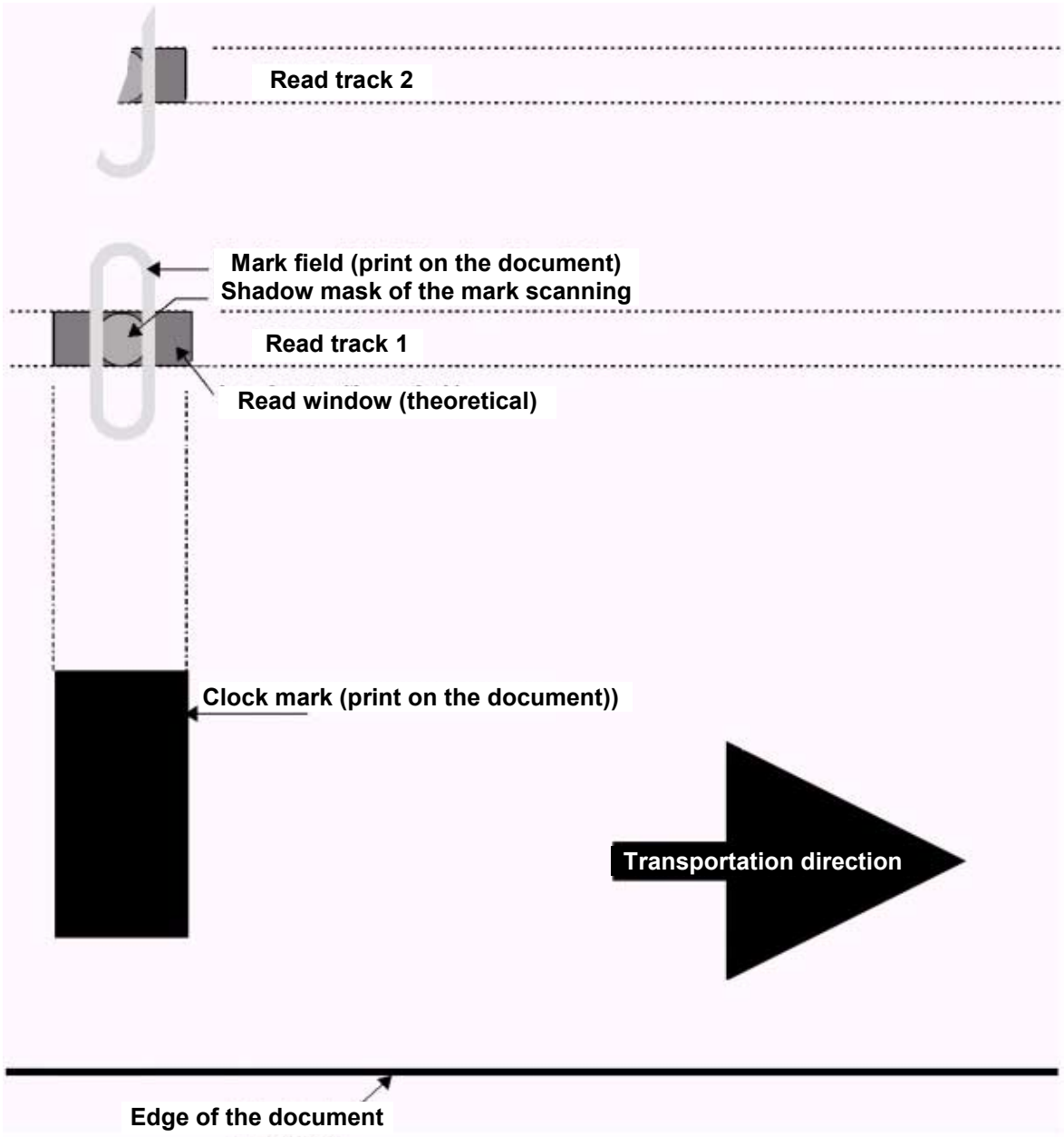
Good read results are of course dependent upon the quality of the documents used in the data acquisition process. In particular, a few minimum requirements must therefore be taken into consideration.

Prerequisite for the accurate scanning of the marks that are on the document is the straight and unimpaired document transportation through the reader's scanning unit. Please take care to observe the following points with regard to the surface condition of documents that are to be scanned:

- Do not place any wrinkled, rolled or folded documents in the reader. Smooth out if necessary any creases or dog-ears beforehand.
- Correction fluids of all types are not permissible!
  If however, correction fluid was applied to a document, be sure that the fluid has dried completely. Otherwise, there is danger that impurities will enter the transport mechanism and the scanning unit and this can lead to inaccuracy in the reading process.
- Improperly attached bar code labels may also cause disturbances in the transport mechanism and document jams.
  Check on this and assure that especially the edges of the labels are attached properly and firmly.
- **Take great care to assure the proper settings of the document stoppers in the intake tray and in the output trays** (see section 3.2 on this).

4.1.1 Marking prescriptions and recommendations

4.1.1.1 The mark field

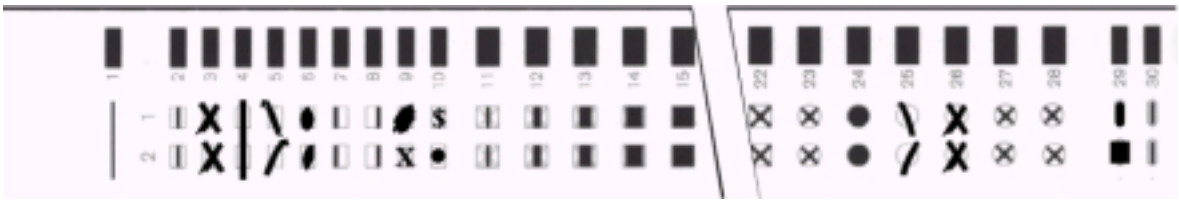

Read track 2
Mark field (print on the document)
Shadow mask of the mark scanning
Read track 1
Read window (theoretical)
Clock mark (print on the document))
Transportation direction
Edge of the document

The mark field identifies the position of the marking on the document. The position of the read window within the mark field is determined by

- the grid size of the scanning established by the reader (here 1/5" distance from one read track to the next read track),
- the width of the clock mark (document design) and
- the size and form of the scan mask (shadow mask).

4.1.1.2 Correct marks

A shadow mask with a diameter of 1 mm is used in the OMR 300S. This insures the exact separation of the individual tracks and at the same time it enables the acquisition of marking crosses. Moreover, because of the scanning that strongly emphasizes the middle section, miscut documents, off-center marks and marks that protrude are compensated for by means of generous tolerances. However, for this it is prerequisite that the entire mark field is utilized for the marks:



Both the position and the size of the read window can be influenced to a great extent by means of the parameterization of the reader in the interface program.

! As basic principle however, the following applies: a mark can be recognized **only** in the **read window** depicted above. Therefore, the better that the mark field is filled by the mark (bar, cross) across the entire length, the more accurately will this mark be recognized under unfavorable circumstances (unsteady document transport, documents cut or printed off straight). And also - the firmer the mark is, the more accurately can the automatic interference masking select a mark and distinguish it from surrounding document dirt.

4.1.1.3 Marking errors

Several typical marking errors are displayed here:

! **Continuous marks are not permissible!**

A white interval of at least 1 mm must be maintained between the marks.

4.1.1.4 Reliable marking instruments

The table below shows which marking instruments are best suited for the respectively utilized signal (infrared / red light).

	Utilized Signal	
Marking instrument	**Infrared scanning**	**Red light scanning**
Pencil HB	very good	very good
Pencil H	good	good
Pentel marker	useless	very good
Staedler 318	useless	very good
Ball point pen black	dubious	good
Ball point pen blue	useless	good
Ball point pen green	useless	good
Ball point pen red	useless	useless
Endorsing ink violet	no signal	dubious
Endorsing ink blue	no signal	very good
Toner *	very good	very good
Printing ink *	very good	very good

* for preprinted marks, e. g. document type

The clock mark is always scanned with infrared light, independent of the signal utilized by the mark scanning.

4.2 Loading the stack of documents

After the reader has been turned on and the last document processed, the document intake tray runs down to the lowest position so that documents can be inserted. You can also run the stacker tray upwards or downwards alternately by pressing the tray button.

- Take a properly aligned stack of documents (approx. 100 sheets) and place it in the intake tray so that it is flush at the back and at the left sides of the housing.

4.3 Starting the read process

♦ Start the read process from the PC.
The stack of documents will automatically be raised to the proper intake height and the first document will be drawn in.

! Since the documents are drawn in from the top, please do not insert more documents while the read process is in progress.

After the last document, the read process will terminate autonomously and the intake tray will be run down to the bottom position.

4.3.1 Display of the operating status

The following table shows the standard displays:

LED		Significance
red	**green**	
blinking	steady-burning	**Power on** At the end of initialization (approx. 5 sec. after pressing the mains switch).
off	steady-burning	**Ready** After insertion of documents and enabling by the tray button.
steady-burning	steady-burning	Document has been drawn in, the data has not yet been called.
off	steady-burning	Document ejection
blinking	blinking **simultaneously** with red LED	An output tray is full; (blinking until the stack has been removed; then "Off").
blinking	blinking **alternately** with red LED	Transportation fault, document intake or ejection jam or double document; (blinking until the fault has been eliminated; then "Off").

After elimination of the disturbance, the reader is only ready again after the tray button has been pressed.

! It is possible that other operating modes or display statuses are parameterized by the application software. In that case, refer to the software description for information on the LED displays.

4.4 Eliminating document jams

The faultless isolation of the documents and their correct feeding in is monitored by light barriers. This prevents two documents from being drawn in at the same time.

In the document path as well, the position of the documents is determined and monitored by light barriers. If a document gets jammed in the paper pathway during transportation, this is detected by the missing presence of the document at the corresponding light barrier and the read process is interrupted.

Reasons for document jamming may be e. g. very wrinkled, glued together or soiled documents. Always eliminate the disturbance by carefully removing the jammed document or foreign object.

4.4.1 Opening and closing the scanner cover

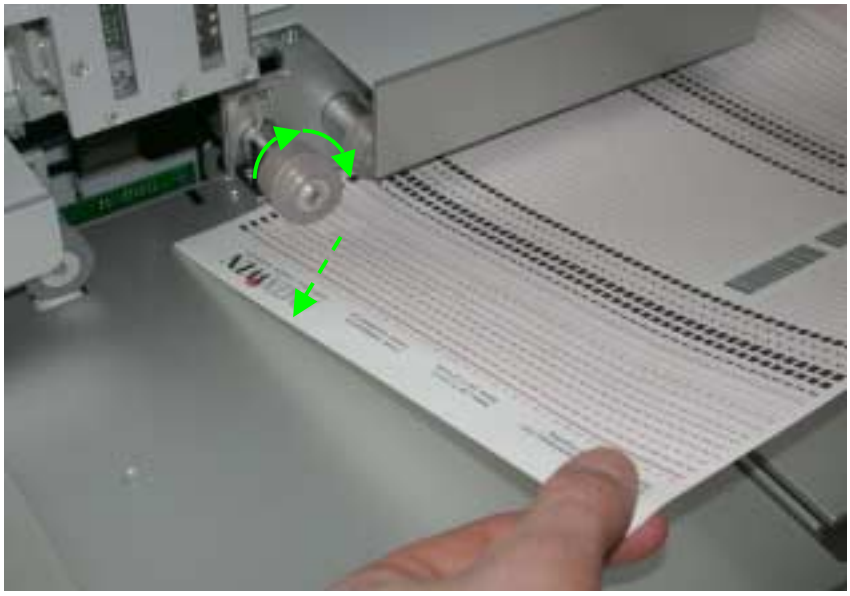
♦ Grasp the scanner cover at the front document intake area and lift it upwards. Fold the cover towards the back until it comes to rest on the housing.

♦ To close it again, swing the scanner cover forwards, until it is clear that the guide pin of the base plate has locked into place.

! Please do not allow the cover to fall backwards onto the housing when opening it, nor to fall forwards onto the base plate when closing it.

4.4.2 Removing documents

- Carefully remove all documents that are located in the paper pathway and ascertain the cause of the document jam (e. g. wrinkled document, dog-ears, poorly glued bar code label).



- Always remove the document in the direction of the transport path. If necessary, turn the double transport rollers with your thumb and pull the respective document carefully out of the transport rollers towards the front; the other transport rollers will move accordingly.

! Pulling out documents in the direction opposite to that of the transport path may lead to damages or maladjustment of the isolation equipment.

- Replace in the intake tray the documents caught in the jam and possibly any other documents to be fed in and restart the read process.

4.5 Trouble shooting

Problems that may possibly arise are listed in the following table. The measures described often help to eliminate the errors.

Problem	Measure
Read errors	
Recognition of the marks is becoming increasingly poorer.	♦ Check if the scanner is dirty. If necessary, clean the covers (protective glass covers) of the read heads (see section 5.5.3). ♦ Check if the lateral setting of the scanner is correct or if it possibly should be adjusted (see section 5.2).
Marks are partially not recognized, especially at the beginning and/or end of the document.	♦ Check if the edges of the documents are straight. ♦ Check if the transport rollers are dirty (see section 5.5.1).
Marks are recognized at places where there are no marks, especially at the beginning and/or end of the document.	♦ Check if the edges of the documents are straight. ♦ Check if the transport rollers are dirty (see section 5.5.1).
Document transport	
No documents are drawn in	♦ Open the scanner cover and check the transport path. Remove any foreign objects without force. ♦ Smooth out the document and flatten down dog-ears if applicable. ♦ Check if bar code labels are not properly glued or if they are turned up at the corners. ♦ Check whether the application software is running. Is the feed-in command from the PC missing or was the data of a document previously read not called? ♦ Turn the reader off and after about 3 sec. turn it on again. Start the PC again according to the software description.
The document is drawn in but is not scanned completely. The ejection behavior is not defined.	♦ Check if the transport rollers are dirty (see section 5.5.1). ♦ Contact your supplier if you are using documents that have clock marks that are wider than those prescribed and that thus do not correspond to the document specification.

Problem	Measure
Document output	
The document is drawn in correctly, the read data is transmitted to the PC, but the reader does not output the document. Only after a document has been removed manually is the next document drawn in.	If none of the measures described above have helped: ♦ Clean all the light barriers in the transport path (see section 5.5.2). ♦ Check if the interface cable is firmly connected. If these measures still do not remedy the situation: ♦ Please contact DATAWIN: Hotline: +49 17 33 87 45 27 Fax: +49 871 43 05 99 29 E-mail: info@datawin.de

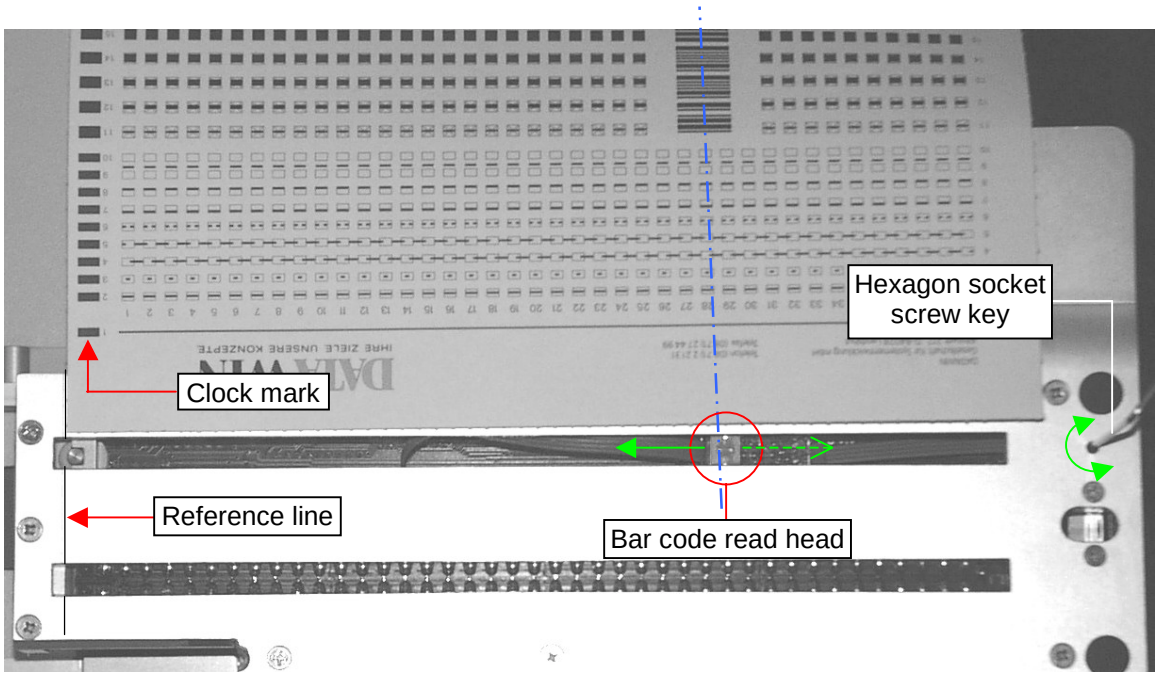
5 Setting, adjusting and cleaning the reader

This chapter describes how you can set the document reader by means of simple mechanical adjustments to correspond to the documents to be read and how you can clean the OMR 300S without great effort to increase the read accuracy. For these operations you will need a hexagon socket screw keys (1.5 and 2.5 mm) and a cross-tip screwdriver (size 1, 300 mm). These tools are included in the scope of delivery of the OMR 300S.

5.1 Setting the bar code read head

To achieve proper recognition of the bar code, the bar code read head must pass over the code to be read - the middle of the code as far as this is possible - while the document is being transported. You can easily check the setting of the bar code read head and, if necessary, correct it.

- Open the scanner cover.
- Place one of the bar code documents to be processed on the scanning unit in such a manner that the edge on which the clock mark is located lies flush along the reference line of the base plate. This reference line identifies the guiding line for the edge of the document during the read process.
  There is an opening located next to the window of the bar code read head; the adjusting screw for the read head is behind this opening:



- Insert the hexagon socket screw key into the bore hole and by turning the key, position the bar code read head above the middle of the bar code that is printed or glued onto the document.

5.2 Adjusting the OMR read head

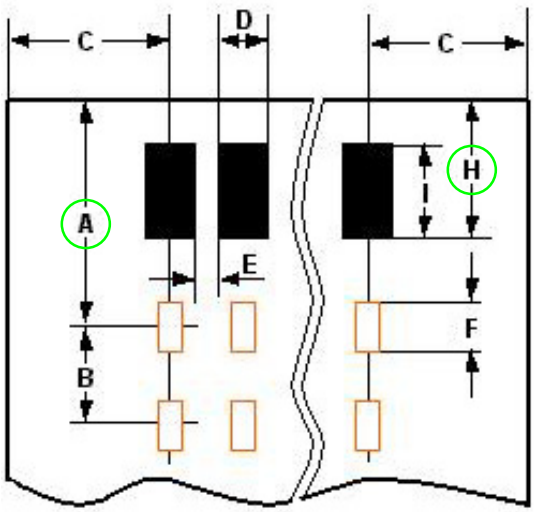
! Only faultlessly printed and cut documents guarantee optimum read accuracy with the greatest possible marking tolerance.

Documents that are printed or cut askew cause the distance of the clock marks and/or of the marking area to be incorrect with respect to the document edge, or the clock mark and the marking area to run slantwise or crookedly across the entire document.

A lateral adjustment error of the OMR read head is present when marks on the document (even quite solid marks) that do not fill out the entire width on the marking area, are not scanned at all or are only scanned in an inaccurate manner. It is also typical that marks are recognized although they are actually too short or are situated clearly off-center in the marking area. By correspondingly adjusting the read head in the document reader it is possible to compensate the deviation within a certain tolerance.

5.2.1 Basic setting "standard document"

The mark scanning is set at the factory to correspond to a "standard document". For example, for 40 track scanning with mark spacing of 1/5", the dimensions are as follows (in mm):



	min.	norm.	max.
A		**13.97**	
B		5.08	
C	10		
D	1		4
E	1.5		
F		3.0	
G	10		
H		**7.62**	
I		5.08	

The dimensions **A** and **H** are decisive for the lateral setting of the OMR read head. By setting the read head accordingly, deviations of these dimensions can be offset to the extent of -1 to +3 mm.

You can find out what the scanning setting is by using the test program (see the "OMR 300S Technical Operating and Service Manual") and the test routines implemented in the reader.

5.2.2 Adjusting the lateral setting of the OMR read head

To adjust the lateral setting of the OMR read head you will need a hexagon socket screw key 1.5 mm. At the front of the scanner cover there is an opening for the hexagon socket screw key.

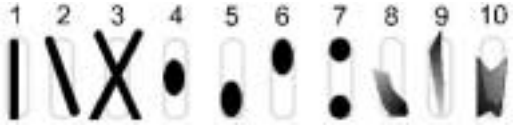
- Insert the hexagon socket screw key into the opening and turn it
  - clockwise: the read head is set further away from the edge of the document (edge with the clock mark) or from the reference line (see section 5.1).
  - counter-clockwise: the read head is set closer to the edge of the document (edge with the clock mark) or to the reference line (see section 5.1).
- Conduct a test run with original documents to check the setting of the read head.

5.2.3 Adjusting the lateral setting of the lower OMR read head (option)

At the front of the lower scanner cover there is also an opening for the hexagon socket screw key for adjusting the lateral setting of the OMR read head.

- Insert the hexagon socket screw key into the opening and turn it
  - clockwise: the read head is set further away from the edge of the document (edge with the clock mark).
  - counter-clockwise: the read head is set closer to the edge of the document (edge with the clock mark).

5.2.4 Marking examples and possible scanning results



		Status A	Status B	Status C
		Scanner and document cut correct	Interval from scanner to reference line too slight related to document	Interval from scanner to reference line too large related to document
	Comments on the marking	**Scanning**		
1	Correct	Accurate	Accurate	Accurate
2	Correct	Accurate	Accurate	Accurate
3	Correct	Accurate	No	No
4	Test point: middle	Accurate	No	No
5	Test point: lower edge	No	No	Yes
6	Test point: upper edge	No	Yes	No
7	Test point: upper & lower edges	No	Yes	Yes
8	Sloppy, bleeding mark	Inaccurate	No	Inaccurate
9	Bleeding mark	Inaccurate	Accurate	Inaccurate
10	Short, bleeding mark (as with an old ball point pen)	Inaccurate	No	Accurate

Status A

Scanner and document cut correct
In this case you do not need to make adjustments.

Status B

! Interval from scanner to reference line **too slight** related to document.

♦ Turn the hexagon socket screw key **clockwise** and note how far the read head moves away from the reference line.

♦ Close the scanner cover and test the results.

Status C

! Interval from scanner to reference line **too large** related to document.

♦ Turn the hexagon socket screw key **counter-clockwise** and note how far the read head moves towards the reference line.

♦ Close the scanner cover and test the results.

5.3 Setting the document isolation

The document isolation is designed for a wide variety of paper qualities and surfaces and it thus operates very reliably. The two feed rollers by means of their turning, draw off the first sheet of paper from the stack of documents and lead it into the feed-in slot and then on to the intake roller. The separating belt lying below the intake roller moves slowly and contrary to the direction of the document; it brakes additional sheets if they are also drawn in and restrains them. The interval between the separating belt and the intake roller is adjustable.

Normally the interval must only be corrected if the automatic intake unit does not function satisfactorily due to the thickness of the documents being processed. Before you adjust the separating belt because of unreliable drawing in of the documents, first check the interval between the belt and the roller:

- Open the scanner cover.
- First of all clean the feed rollers, the intake roller and the separating belt (see section 5.3.1) with a cloth that is lightly saturated with spirits of wine and then test the intake behavior. **Only in the event that you do not notice an improvement, take the following steps:**
- With lowered stack feed, insert a document between the intake roller and the separating belt.

- Move the sheet of paper back and forth. It should be possible to move it easily and smoothly without rubbing and it should be free of play. If the result is not satisfactory, you must adjust the separating belt accordingly. As tool you will need a hexagon socket screw key 2.5 mm.
- First of all, "close" the document isolation by turning the adjusting screw counter-clockwise until the document is tightly clamped between the intake roller and the separating belt. This is fundamentally necessary before all adjustment operations in order to initially release the tension on the spring system of the document isolation.

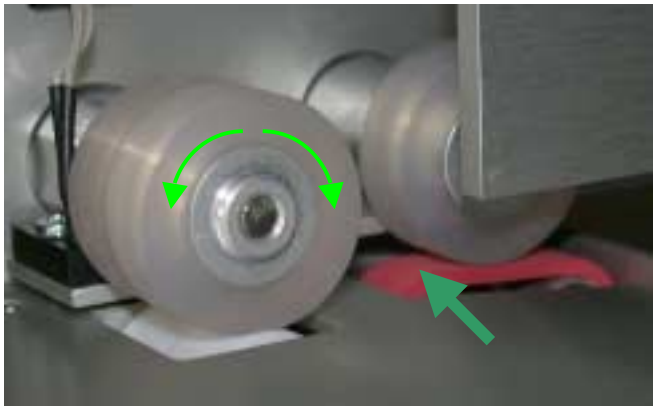
- Now turn the screw carefully in clockwise direction until the document can be moved easily without much friction, but still without play.
- Then to check the setting, attempt to push **two** sheets of paper between the intake roller and the separating belt. Strong resistance must be noticeable.

The document isolation is then set correctly.

! The error often occurs that the interval between the roller and the belt is set too narrowly.

5.3.1 Cleaning the separating belt

- To clean the separating belt, saturate a lint-free cleaning cloth lightly with spirits of wine and press the cloth against the outer surface of the belt. By manually turning the double transport rollers you can simultaneously turn the belt until it is cleaned.



! When you are working with spirits of wine, be sure that there are no burning objects (cigarettes or similar) in the environment of the working place.

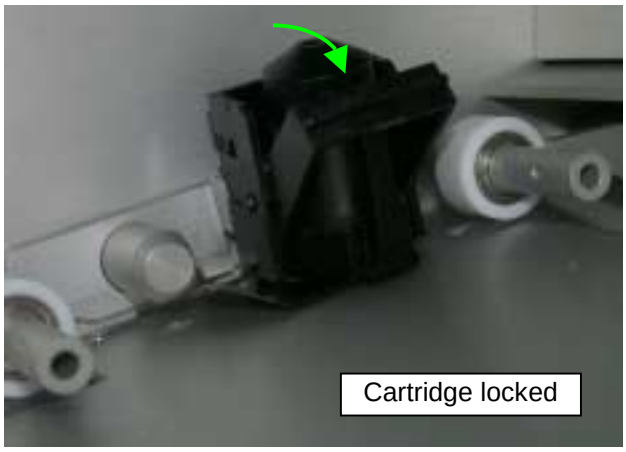
5.4 Replacing ink cartridges in the printer

The printer is located in the lower transport path next to the curved baffle plate.

♦ Remove the guide plate by pulling it **straight towards the front** out of its holder.

A clip locks the installed ink cartridge in place in the printer.

- Tilt the clip backwards and lift out the cartridge towards the top.
- Place the new cartridge in the printer and tilt the clip forwards again.



- Remount the guide plate.
  To do so, set the pins back into their sockets and press the guide plate down again until it rests into place and lies flat.

The printer is again ready for operation.

5.5 General information on cleaning the OMR 300S

DATAWIN document readers are designed for ease of maintenance. Very few maintenance and service operations are necessary and these can be carried out to a great extent without tools. It is only hypothetically possible to specify cleaning cycles since soiling and also wear and tear of the individual components of the reader depend largely on the operating and ambient conditions of usage, such as

- dust contents, humidity and flow of the ambient air,
- abrasive properties of the document materials and printing,
- general degree of soiling of the documents,
- daily volume of documents processed,
- weight of the documents.

Cleaning cycles may be established based on empirical values gathered in the course of regular optical checks and from the cycles of read errors that require maintenance operations. For readers that are used in conditions that are not extremely inclement, cleaning of the transport system should be effected after approximately **100,000** documents have been read.

Even for devices that are not in regular operation, dust accumulates on the silicone rollers that is pressed and compacted during subsequent read processes and that then leads to smoothing and hardening of the surfaces.

! Independent of the volume of documents processed, you should therefore clean the transport rollers regularly **at least once a month**.

This routine cleaning requires about 5 minutes time; no special tools are needed.

- **Transport rollers** and the **read window** are cleaned with
  - common methylated spirits,
  - cotton swabs,
  - and a lint-free cloth.
- **Light barriers** and **transport slits** should be blown out. To do this you can use the following
  - a compressed air can (available at photo shops) or
  - a vacuum cleaner with a narrow nozzle,
    (or, instead of these you can simply blow them out forcefully yourself!)
- **Housing surfaces** and the **surfaces traversed by the documents** can best be cleaned with
  - **silicone-free** hard wax from an automotive supplier.

! **When you are working with spirits of wine, be sure that there are no burning objects (cigarettes or similar) in the environment of the working place.**

5.5.1 Cleaning the transport rollers

- Turn the reader off and open the scanner cover.
- Using a cotton swab that has been saturated with spirits of wine (it may be strongly saturated), clean the silicone rollers.
  Change swabs as soon as they become soiled.

! When you are working with spirits of wine, be sure that there are no burning objects (cigarettes or similar) in the environment of the working place.

! When cleaning the intake roller and the pair of ejection rollers, please take care to assure that the cotton swab is not pulled in between the pressure roller and the silicone rollers.

5.5.2 Cleaning the light barriers

In general the light barriers are not very susceptible to soiling. However, in case you are using documents that are particularly affected by dust and produce rubbed-off particles, it may happen that such particles collect and they may unfortunately be deposited right in front of a light barrier.

- Turn the reader off and open the scanner cover.
- Clean the light barrier windows using a sturdy brush, compressed air or a vacuum cleaner (or simply a forceful breath of air).

5.5.3 Cleaning the OMR and the bar code read heads

- Turn the reader off and open the scanner cover.
- Rub the read windows clean using a lint-free cloth that has been saturated with spirits of wine.
  Take care to assure that all residues of correction fluids and glues have definitely been removed.

! When you are working with spirits of wine, be sure that there are no burning objects (cigarettes or similar) in the environment of the working place.

5.5.4 Cleaning the housing surface

- Use a brush or similar to free the surfaces of the reader housing from dust. In addition, long-term protection can be achieved if you apply **silicone-free** hard wax to the surfaces.

  The operating behavior of the reader will be positively influenced if you also polish

  - the guide plates in the scanner cover,
  - the document bed of the intake tray and
  - the document stoppers.

  with **silicone-free** hard wax. Your reader was also treated with this wax before it was delivered.

- If the surfaces of the document transport path no longer permit easy gliding of the documents because they have become soiled, you can optimize the route that the documents traverse by renewed polishing.

! In carrying out these operations, be absolutely certain that the parts of the transportation mechanics (all rotating parts of the reader) **do not come in contact with the wax**. For safety sake, when polishing the surfaces that the documents pass across in areas near the read windows, cover the respective rollers with paper. If despite this, rollers come into contact with the wax, you must clean them again very carefully with spirits of wine.

6 Requirements on the documents

This chapter describes the requirements on the documents to be processed and provides tips on the OMR marks to ensure smooth operation of the OMR 300S.

6.1 External characteristics

Good read results presuppose good quality of the documents to be processed. Therefore, certain minimum requirements must be taken into consideration.

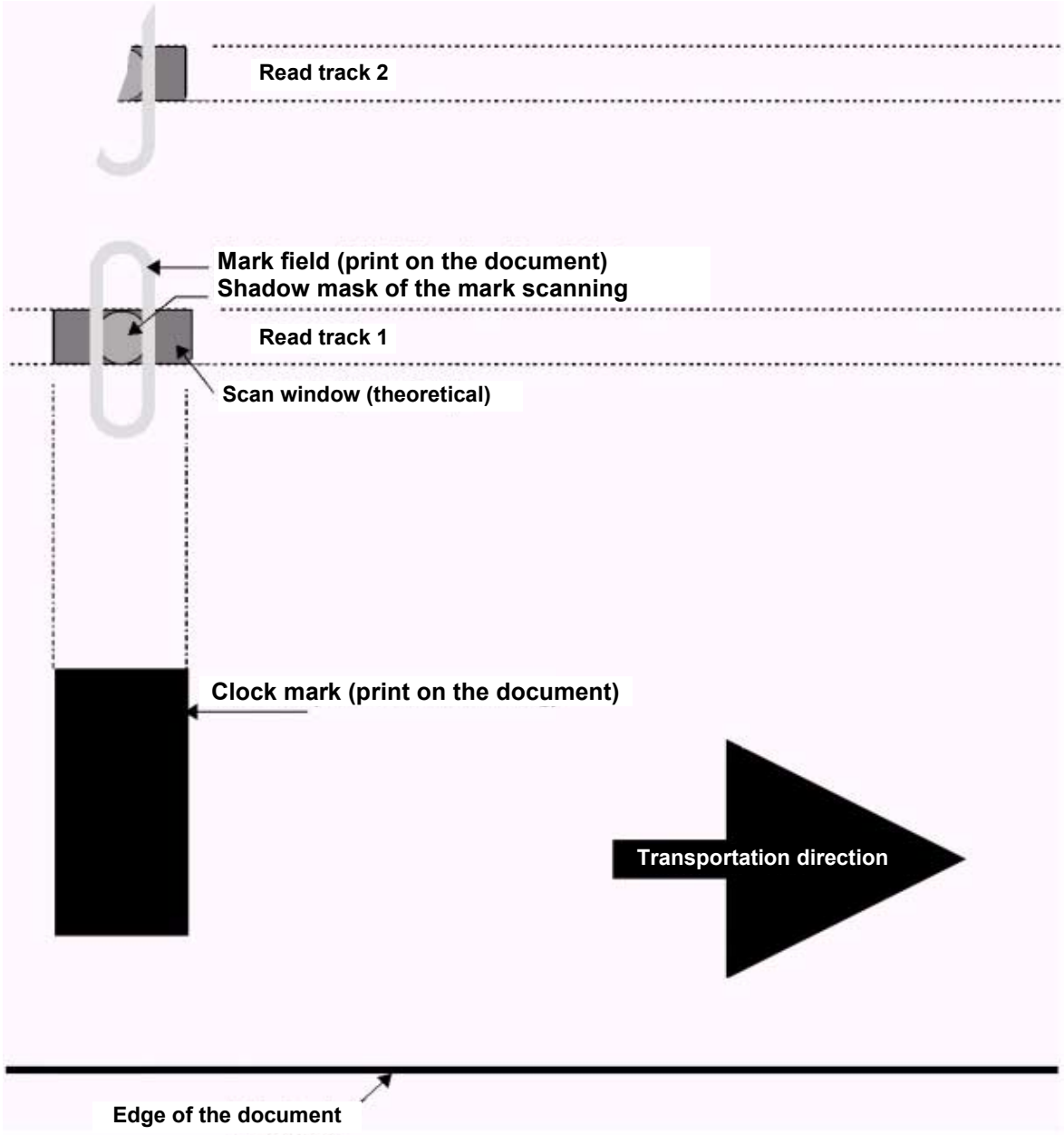
Prerequisite for the accurate scanning of the marks on the documents is a straight and unimpaired transportation of the documents through the reading stations.

The external characteristics of the documents to be read are also important:

- Do not place any wrinkled, rolled or folded documents in the reader.
  If necessary, smooth out the document beforehand and eliminate any dog-ears.
- The use of correction fluids is forbidden!
  Nevertheless, in the event that a document was treated with correction fluid, please assure that the fluid has dried completely. Otherwise there is danger that dirt may pass into the transportation mechanism and into the scanning unit which could lead to reading inaccuracies.
- Improperly glued bar code labels may also cause transportation disturbances and document jams. Therefore, please press down the edges of the labels firmly.

6.2 Prescriptions and recommendations concerning OMR marks

6.2.1 The mark field

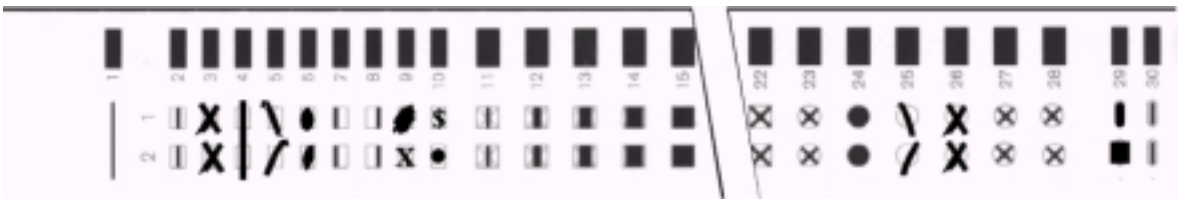

Read track 2
Mark field (print on the document)
Shadow mask of the mark scanning
Read track 1
Scan window (theoretical)
Clock mark (print on the document)
Transportation direction
Edge of the document

The mark field identifies the position of the marking on the document. Where the scan window is positioned within the mark field is determined by

- the grid size of the scanning established by the reader (here 1/5" distance from one read track to the next read track)
- the width of the clock mark (document design) and
- the size and form of the scan mask (shadow mask)

6.2.2 Correct marks

A shadow mask with a diameter of 1 mm is used in the OMR 300S. This insures the exact separation of the individual tracks and at the same time it enables the acquisition of marking crosses. Moreover, because of the scanning that strongly emphasizes the middle section, miscut documents, off-center marks and marks that protrude are compensated for by means of generous tolerances. However, for this it is prerequisite that the entire mark field is utilized for the marks.



Both the position and the size of the read window can be influenced to a great extent by means of the parameterization of the reader in the interface program.

! As basic principle however, the following applies: a mark can be recognized **only** in the **read window** depicted above. Therefore, the better that the mark field is filled by the mark (bar, cross) across the entire length, the more accurately will this mark be recognized under unfavorable circumstances (unsteady document transport, documents cut or printed off straight). And also – the firmer the mark is, the more accurately can the automatic interference masking select a mark and distinguish it from surrounding document dirt.

6.2.3 Marking errors

Several typical marking errors are displayed here:

! **Continuous marks are not permissible!**

A white interval of at least 1 mm must be maintained between the marks.

6.2.4 Reliable marking instruments

The table below shows which marking instruments are best suited for the respectively utilized signal (infrared / red light).

	Utilized Signal	
Marking instrument	**Infrared scanning**	**Red light scanning**
Pencil HB	very good	very good
Pencil H	good	good
Pentel marker	useless	very good
Staedler 318	useless	very good
Ball point pen black	dubious	good
Ball point pen blue	useless	good
Ball point pen green	useless	good
Ball point pen red	useless	useless
Endorsing ink violet	no signal	dubious
Endorsing ink blue	no signal	very good
Toner *	very good	very good
Printing ink *	very good	very good

* for preprinted marks, e. g. document type

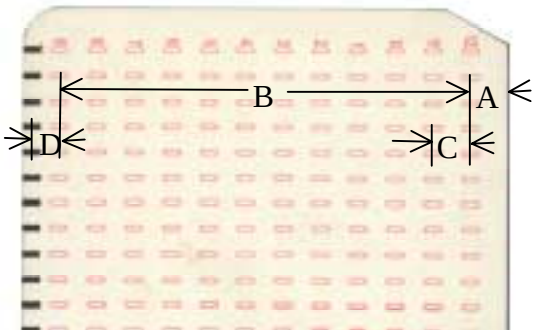
The clock track is always scanned with infrared light, independent of the signal utilized by the mark scanning.

6.3 DATAWIN OMR document specifications

(Version 040615)

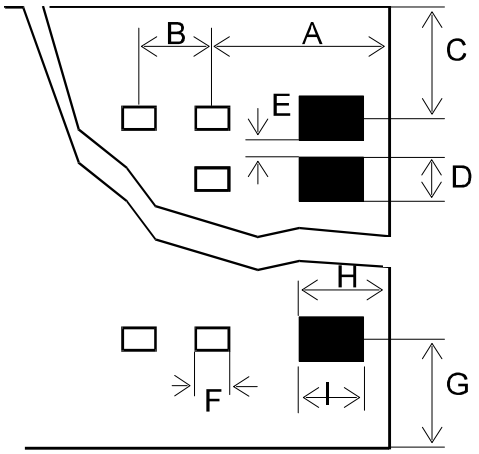
6.3.1 Standard document

Standard document 12 (16) tracks, spacing ¼"
(All dimensions in mm)



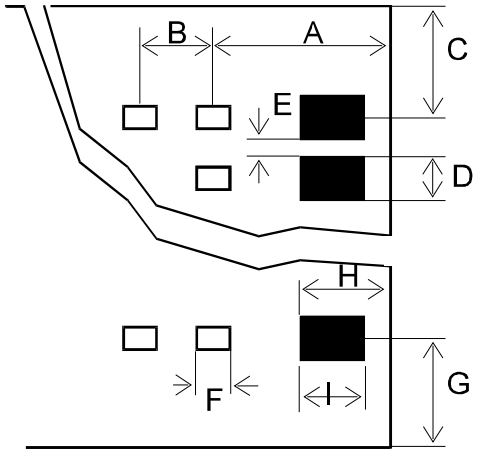
	norm.
A	6.35
B	n x A
C	6.35
D	5.0

Standard document 40 tracks, spacing 1/5"
Standard document 16 (18) tracks, spacing 1/5"
(All dimensions in mm)



	min.	norm.	max.
A		13.97 [2])	
B		5.08	
C	10		
D	1		4
E	1.5 [1])		
F		3.0	
G	10		
H		7.62 [2])	
I		5.08	

Standard document 48 tracks, spacing 1/6"
(All dimensions in mm)



	min.	norm.	max.
A		11.43 [2])	
B		4.23	
C	10		
D	1		4
E	1.5 [1])		
F		3.0	
G	10		
H		8.89 [2])	
I		3.81	

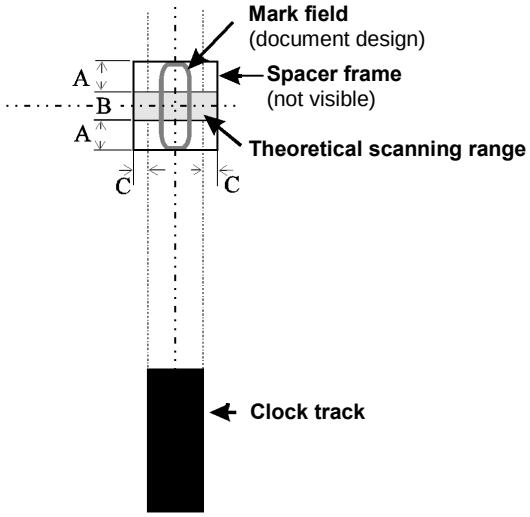
[1]) Can be smaller for special coding techniques, according to the manufacturer.
[2]) DATAWIN mark readers permit a scanning shift of -1 +3 mm.
However, the dimensions A and H must then deviate in the same direction and by the same values.

Document quality
Mechanical properties as per DIN 6723/6724
Optical features: OCR quality as per DIN 66223
PCS value for clock marks: > 60%

Document format
(length in transport direction > width)

Type of reader	**Min. document** (mm)	**Max. document** (mm)	**Paper weight** (g/m^2) As per DIN 19307
OMR 300S	110 x 50	305 x 230	80 - 140

6.3.2 Scanning window



Dimensions: A = min. 1.0 mm
B = 1.0 mm
C = min. 0.5 mm

Marks (and readable print on documents) are recognized in the "theoretical scanning range" shown on the left.

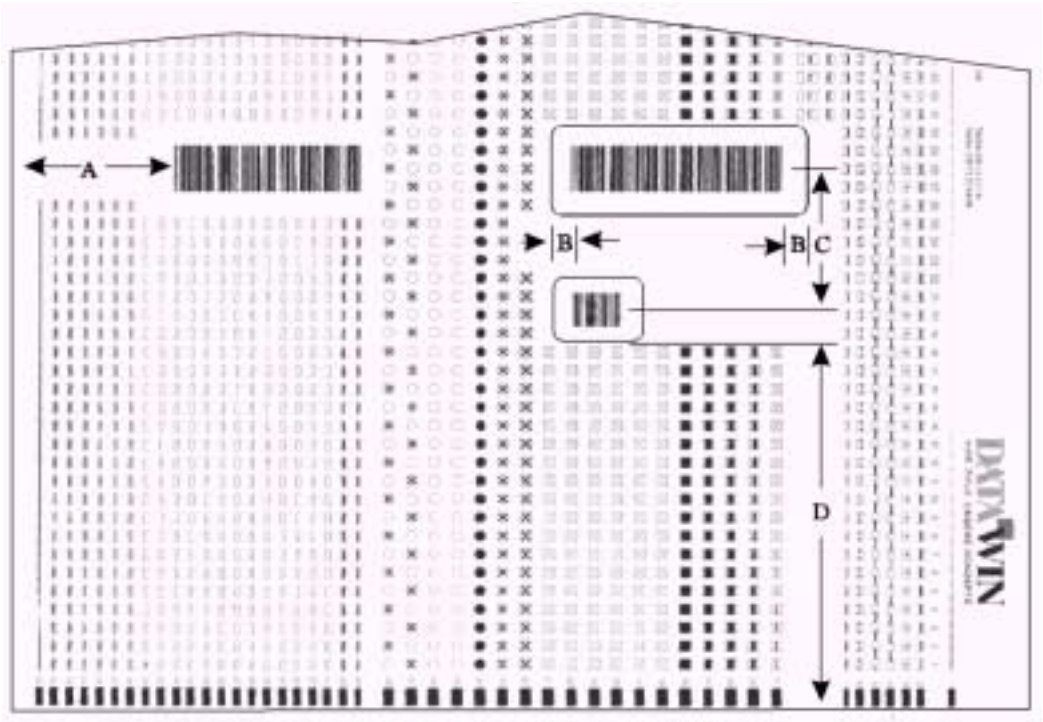
If no specific scanning procedures are used to mask black print (scan mode, window definition), it is recommended that no readable inscriptions and graphics be applied in the area of the displayed "spacer frame".

The spacer frame is dimensioned in such a manner that minor deviations in document design, cut and transport are compensated.

6.3.3 Bar codes labels and imprints

Dimension (s. sketch)	Designation	Min. mm	Max. mm	Comment
A	Distance to document end	35	–	Distance of last bar code module to document edge
B	White margin	10	–	Area before the first and after the last bar code module that must be white or in blind print
C	Distance between 2 bar code tracks	11	55	Only for "double bar code" option. Greater distances on request. Please note: the distance requested by the customer is set in the factory and cannot be changed.
D	Distance to lower edge of the doc – OMR 300S	18	195	Distance of the bar code module to the lower edge of the document. The area of the clock marks must **always** remain free!

During the scanning of the bar code by the document reader, the bar code read head must be able to scan the whole bar code in at least one diagonal. Therefore it is best in any case to print the bar code as high as possible in order e. g. to be able to compensate gluing inaccuracies.



6.3.4 Permissible document colors for red light and infrared light scanning

Measurements with blind colors of the ink manufacturer "Zeller & Gmelin"
(% specification corresponds to the blind color unwanted signal)

Scanning:	infrared light: 950 nm	red light: 635 nm

Print color	Color no.	Value %	Comment	Value %	Comment
paper	white	< 1		< 1	
yellow	63376	3	good	4	still good
yellow	64400	3	good	4	still good
yellow	64401	< 1	very good	< 1	very good
orange	63079	2	very good	4	good
red	62429	2	very good	< 1	very good
red	63082	2	very good	4	still good
red	63112	2	very good	4	still good
red	65108	< 1	very good	< 1	very good
red	65204	< 1	very good	4	still good
red	65205	2	very good	4	still good
violet	63081	3	good	12	dubious
blue	62432	3	good	44	useless
blue	63893	2	very good	32	useless
blue	65107	2	very good	16	poor
blue-green	63892	3	good	44	useless
blue-green	65109	< 1	very good	24	useless
green	62431	3	good	48	useless
green	63483	< 1	very good	44	useless
green	63505	3	good	36	useless
green	64513	3	good	80	useless
yellow-green	63891	3	good	48	useless
brown	62433	4	still good	16	poor
brown shade (1 g/m^2)	18482	2	very good	24	useless
brown shade (2 g/m^2)	18482	2	very good	40	useless

The blind color "violet", classified under red light as "dubious" should be avoided if possible or only used after consultation with the manufacturer!